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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,961	09/29/2003	Martin Dust	MOH-P010032	3944

24131 7590 11/21/2005

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EXAMINER	
CHAPMAN JR, JOHN E	

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 11/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EK

Office Action Summary	Application No.	Applicant(s)	
	10/673,961	DUST, MARTIN	
	Examiner	Art Unit	
	John E. Chapman	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,7-11,13,16,17,19 and 22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,7-11,13,16,17,19 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 2 and 7-11, 16, 17 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harth, III et al. in view of Krautkramer et al.

Harth teaches measuring the thickness of a layer 18 in a vessel 14 using an ultrasonic transducer 40 in contact with an outside diameter surface of the vessel, and teaches that it is known in the art to measuring the thickness of the cladding layer of fuel rods (col. 4, lines 2-3). Accordingly, it would have been obvious in view of the disclosed background to use the apparatus of Harth to measure the thickness of the cladding layer of a fuel rod. The probe 40 appears to have a planar surface region (see page 20 of the Panametrics, Inc. transducer catalog), and if not, it would have been obvious in view of Krautkramer to use a probe having a planar surface region. Krautkramer teaches that it is well known in the art to use a flat probe on a cylindrical surface (see pages 290-293). Harth teaches operating at a frequency up to 100 MHz (see col. 4, lines 3-5), which frequency is required for cladding layers whose thickness lies between .08 and 0.1 mm (see col. 3, line 66 to col. 4, line 6). Accordingly, it would have been obvious to measure thickness of tubes having a cladding layer down to .08 and 0.1 mm. In particular, it would have been obvious to measure thickness of tubes having a wall thickness less than 1 mm and a cladding layer between .08 and 0.1 mm.

Regarding claims 2, 11 and 17, Krautkramer teaches that the contact face has the shape of a narrow rectangle (see pages 290-291).

Regarding claims 7, 10 and 22, it would have been obvious to measure thickness of a cladding layer greater than .08 to 0.1 mm, such as 0.15 mm.

3. Claims 4, 13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harth, III in view of Krautkramer as applied to claims 1, 8 and 16 above, and further in view of Trulson et al.

The added difference between the claimed invention and the prior art consists in digitally processing the echo signal. Trulson teaches that it is well known in the art to digitally process an echo signal to reduce the chance of error and obtain more consistently accurate measurements (see col. 1, lines 53-57). Accordingly, it would have been obvious to digitally process the echo signals in Harth in order to reduce the chance of error and obtain more consistently accurate measurements.

4. Claims 1, 2 and 7-11, 16, 17 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al. in view of Krautkramer et al.

Nakano et al. teaches measuring the thickness of a cladding layer 2 in a clad tube 1 (see col. 2, line 10) using an ultrasonic probe 3 in contact with an outside diameter surface of the tube. Nakano et al. does not indicate whether the clad tube is for nuclear fuel, but such limitation is not given patentable weight, since a steel tube (see col. 1, line 20) is inherently capable of containing nuclear fuel. The coupling surface of the probe 3 appears to be curved (see Fig. 8). Hence, the main difference between the claimed invention and the prior art consists in providing the probe 3 with a planar surface region. Krautkramer et al. teaches that it is well known in the

art to use a flat probe on a cylindrical surface (see pages 290-293). Accordingly, merely to provide a planar surface on the probe 3 of Nakano et al. would have been obvious to one having ordinary skill in the art for the purpose of inspecting the cylindrical clad tube 1. Regarding the wall thickness of the tube, Nakano et al. teaches measuring the thickness of clad metal below 10 mm (see col. 9, lines 58-61). It is generally considered to be within the level of ordinary skill in the art to use a known method of testing on different sized articles. Accordingly, it would have been obvious to one of ordinary skill in the art to use the method of Nakano et al. measure the thickness of clad metal below 1 mm. Regarding the operating frequency, Nakano et al. teaches preferably utilizing a frequency range from 2 to 10 MHz (see col. 9, lines 62-63). It is well known in the art to use a higher frequency (smaller wavelength) in order to measure smaller distances. Accordingly, it would have been obvious to increase the frequency in order to measure the thickness of clad metal below 1 mm.

Regarding claims 7, 10 and 22, it would have been obvious to one of ordinary skill in the art to extend the utility of the method of Nakano et al. to measuring the thickness of a cladding layer of approximately 0.15 mm.

5. Claims 4, 13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano in view of Krautkramer as applied to claims 1, 8 and 16 above, and further in view of Trulson et al.

The added difference between the claimed invention and the prior art consists in digitally processing the echo signal. Trulson teaches that it is well known in the art to digitally process an echo signal to reduce the chance of error and obtain more consistently accurate measurements

(see col. 1, lines 53-57). Accordingly, it would have been obvious to digitally process the echo signals in Nakano in order to reduce the chance of error and obtain more consistently accurate measurements.

6. Claims 1, 2 and 7-11, 16, 17 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pleinis et al. in view of Krautkramer et al.

Pleinis et al. teaches measuring the thickness of a tube liner in a zirconium tube for nuclear fuel using an ultrasonic transducer. Pleinis et al. does not indicate whether the transducer is in contact with the tube. Krautkramer et al. teaches that it is well known in the art to use a flat probe on a cylindrical surface (see pages 290-293) to ultrasonically inspect a cylindrical object. Accordingly, merely to use a flat probe on the surface on the zirconium tube of Pleinis et al. would have been obvious to one having ordinary skill in the art for the purpose of measuring the thickness of the tube liner. Regarding the wall thickness of the tube, it is generally considered to be within the level of ordinary skill in the art to use a known method of testing on different sized articles. Accordingly, it would have been obvious to one of ordinary skill in the art to use the method of Nakano et al. measure the thickness of tubes having a wall thickness less no greater than 1 mm. Regarding the operating frequency, Pleinis et al. teaches utilizing a 10 MHz ultrasonic transducer (see col. 2, line 56). It is well known in the art to use a higher frequency (smaller wavelength) in order to measure smaller distances. Accordingly, it would have been obvious to increase the frequency in order to measure the thickness of clad metal below 1 mm.

Regarding claims 7, 10 and 22, it would have been obvious to one of ordinary skill in the art to extend the utility of the method of Pleinis et al. to measuring the thickness of a tube liner of approximately 0.15 mm.

7. Claims 4, 13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pleinis in view of Krautkramer as applied to claims 1, 8 and 16 above, and further in view of Trulson et al.

The added difference between the claimed invention and the prior art consists in digitally processing the echo signal. Trulson teaches that it is well known in the art to digitally process an echo signal to reduce the chance of error and obtain more consistently accurate measurements (see col. 1, lines 53-57). Accordingly, it would have been obvious to digitally process the echo signals in Pleinis in order to reduce the chance of error and obtain more consistently accurate measurements.

8. Applicant's arguments filed on October 12, 2005 have been fully considered but they are not persuasive. Applicant argues that cladding tubes for nuclear fuel are <u>always formed</u> of zircaloy and that a liner layer is metallurgically connected to the base material, whereas Harth pertains to the determination of the thickness of a layer connected to the inner side of a nuclear vessel in a <u>non-metallurgical</u> manner. Applicant provides an article by Sandvik Special Metal as evidence that a liner layer in zirconium alloy fuel clad tubing is metallurgically connected to the base material. However, the article does not support applicant's assertion that cladding tubes for nuclear fuel are <u>always formed</u> of zircaloy. Rather, it merely shows that zirconium alloy is used

for fuel clad tubing. Furthermore, it does not show that a liner layer is necessarily metallurgically connected to the base material. While some processes may result in the zirconium layers being metallurgically connected with each other, it is not clear that metallurgical bonding is inherent in all processes for forming cladding tube layers for nuclear fuel. Nor is it clear that the layers of a nuclear fuel cladding tube necessarily comprise two almost identical zirconium alloys. Accordingly, applicant's arguments are deemed to be more specific than the invention claimed.

Applicant argues that to mount a cylindrically-bent surface onto a flat test head, as described by Krautkramer, would cause the extremely weak signal between the layers of the cladding tube to perish in the base noise. Applicant fails to point how it is that applicant's method succeeds whereas the prior art method would fail, and how such is reflected in the claims. The claims merely recite the step of coupling the planar surface region of a high-frequency probe with a wetted surface of the tube by a contact technique. It is not clear how this step avoids the problem of the extremely weak signal between the layers of the cladding tube perishing in the base noise. While Krautkramer may teach using a curved surface instead of a planar surface to increase sensitivity, the claims do not recite any manner of increasing the sensitivity over a planar surface region of a high-frequency probe coupled with a wetted surface of the tube by a contact technique.

Regarding the Nakano et al. patent, applicant argues that a cladding tube of zirconium alloy is meant, and that all layers are formed of Zr alloy. As pointed out above, such argument is deemed more specific than the invention claimed.

Applicant argues that Nakano uses an ultrasound test head with a frequency of 2-10 MHz. However, such frequencies are adapted to the dimensions measured (10 mm), and increasing the frequency would have been obvious to measure smaller dimensions (1 mm). Note, for example, col. 3, line 66, to col. 4, line 2, of Harth et al.

Applicant argues that Pleinis et al. teaches that it is not possible to use conventional methods of ultrasound measurement to determine the thickness of a liner layer in cladding tubes for nuclear fuel, since the signal reflected from the interface of the two layers is extremely weak, and that combining the teachings of Krautkramer with those of Pleinis would further weaken an already weak signal. However, Pleinis teaches the modification of well known ultrasonic measurement techniques by the blocking out of extraneous signals in order to enable the normally weak signal to be identified and used. The blocking out of extraneous signals is neither recited in the claims, nor excluded by the claims. Moreover, the claims do not recite any specific manner that enables the applicant to identify and use the normally weak signal whereas the prior art fails. While Pleinis may have taught away from modifying the common ultrasonic techniques by coupling the planar surface region of a high-frequency probe with a wetted surface of the tube by a contact technique, it is not evident that Pleinis teaches away from so modifying the ultrasonic method disclosed by Pleinis, i.e., by the blocking out of extraneous signals in order to enable the normally weak signal to be identified and used.

To the extent that Krautkramer teaches that reduced sensitivity is to be accepted in using a flat probe on a curved surface, the fact that there may be a disadvantage to using a flat probe does not render such use unobvious. Rather, one must weigh the disadvantages with the

advantages, for example, the versatility of being able to use a flat probe to measure cladding tubes having differing radii of curvature.

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John E. Chapman whose telephone number is (571) 272-2191. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John E Chapman
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Art Unit 2856